

What is claimed is:

1. An optical path control apparatus comprising:

a first substrate;

a second substrate movably provided for said first substrate;

5 a mirror section provided on said second substrate; and

a driving section which moves said second substrate such that a first optical path of input light to said mirror section is optically connected to
10 one of a plurality of second optical paths.

2. The optical path control apparatus according to claim 1, wherein said driving section is a ultrasonic wave generating source, and

said second substrate is moved by progressive
5 waves generated by said ultrasonic wave generating source and is located on a position by standing waves, and

said first optical path is optically connected to said second optical path associated with said
10 position.

3. The optical path control apparatus according to claim 1, wherein said driving section is a ultrasonic wave generating source is a piezo-electric device.

TOP SECRET

4. The optical path control apparatus according to claim 1, wherein said driving section includes two electromagnets,

said second substrate is a permanent magnet
5 provided between said two electromagnets,

said permanent magnet is moved between two positions based on magnetic polarities of said two electromagnets, and

said first optical path is optically connected to
10 said second optical path associated with one of said positions.

5. The optical path control apparatus according to claim 1, wherein said second substrate has a gear shape, and said mirror section is provided on said second substrate via a base section,

5 said driving section has an electrostatic actuator, and rotates said second substrate based on force generated by said electrostatic actuator such that said mirror section is rotated, and

said first optical path is optically connected to
10 said second optical path associated with a rotation angle of said mirror section.

6. The optical path control apparatus according to claim 1, wherein said second substrate has a micro

100-2-2001

said driving section has lasers, and rotates said
5 second substrate based on laser beams emitted by said
lasers, and

7. The optical path control apparatus according to claim 1, wherein said second substrate is provided in a concave section of said first substrate, said concave section being filled with fluid;

said mirror section reflects said input light
10 based on the movement of said second substrate such
that said first optical path is optically connected to
said second optical path.

9. The optical path control apparatus according to claim 1, wherein said mirror section is a lump type

10. An optical path control apparatus comprising:

a mirror section which is provided on said

5 light to input light by said mirror section in

11. The optical path control apparatus according to

mirror portions, each of which comprises:

5 an underside layer provided under said mirror

wherein said tow mirror portions attract or repel

supplied to said conductive lines such that a

12. The optical path control apparatus according to

a mirror layer provided as a surface layer;

5 layer; and

transformed layer,

wherein said mirror layer of said mirror section

is transformed through transformation of said
10 transformed layer in response to supply of said input
signal such that a reflection angle of said mirror
section is changed.

13. The optical path control apparatus according to claim 10, wherein said mirror section having two mirror portions, each of which comprises:

a mirror layer provided as a surface layer; and
5 a magnetic layer provided under said mirror
layer,

wherein said two mirror portions attract or repel
each other through magnetization of said magnetic
layer based on said input signal such that a
10 reflection angle of said mirror section is changed.

14. The optical path control apparatus according to claim 10, wherein said mirror section comprises:

a mirror layer provided as a surface layer;
a shape memory layer provided under said mirror
5 layer; and

a heating layer provided under said shape memory layer,

wherein said mirror layer of said mirror section
is transformed due to transformation of said shape
10 memory layer through heating by said heating layer in
response to said input signal such that a reflection

angle of said mirror section is changed.

15. The optical path control apparatus according to claim 10, wherein said mirror section is a thin film mirror.

16. A method of manufacturing a mirror section comprising the steps of:

providing a die of semiconductor having a concave section;

5 forming a copper layer on a surface of said die;

forming a mirror film on said copper layer;

forming a transforming film on said mirror film;
film to produce a laminate structure of said copper
layer, said mirror film, and said transforming film;

10 transferring said laminate structure onto a base;
and

removing said copper layer to produce said mirror
section on said base.

17. The method according to claim 16, wherein said
step of forming said transforming film comprises the
steps of:

forming a transformed film on said mirror film;

5 and

forming an electrode film on said transformed
film.

19. The method according to claim 16, further comprising the steps of:

- forming a resist layer on said mirror section;
- forming an opening in said resist layer
- 5 corresponding to a tip portion of said mirror section;
- and
- removing said tip portion of said mirror section.

forming a connection layer on a base;
locating a bump on said connection layer; and
5 pushing a die against said bump to produce a
mirror section.

a first substrate;

a second substrate movably provided for said first substrate;

5 a mirror section provided over said first and second substrate; and

10 one of a plurality of second optical paths.

a thermal transforming cell;

transforming cell; and

5 a heating section which heats said thermal transforming cell.

23. A method of switching an output optical path comprising the steps of:

5 moving or transforming said mirror section; and

5 force generated by laser beam, pressure of fluid, and
mechanical force.